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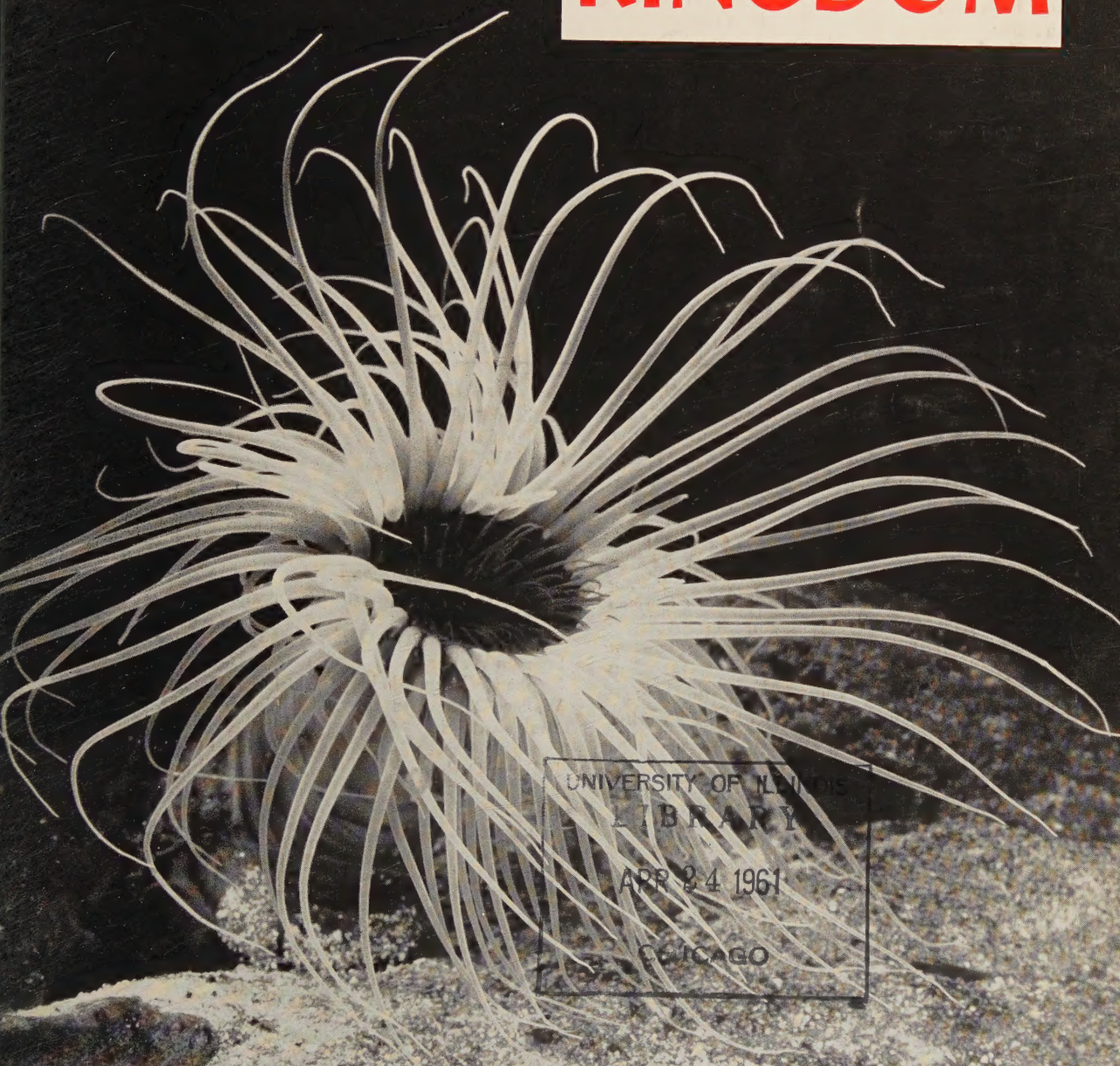
ANIMAL KINGDOM



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ANIMAL KINGDOM

Bulletin of the New York Zoological Society

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THE CARE OF WILD ANIMALS

THE CARE of wild animals in modern zoos has come to be a highly complex art, involving many skills that were unknown even a few decades ago. An excellent development is today's recognition of the fact that to be healthy an animal must be content. Consequently, a great improvement has occurred in providing the animals with ample space as well as a pleasant environment and gentle handling. Much has been learned concerning proper diets and related health measures. So it is that extremely delicate species, such as hummingbirds, as well as numerous others, can now be maintained — a success that was unattainable even a few decades ago.

Today our Zoological Park has more than a thousand different kinds of animals within its collections. It is safe to say that in the early days of the century the attempt to keep many of these would only have met with failure.

Zoo management is a highly rewarding profession but as in any other, success is occasionally tempered with keen disappointments. For instance, it was a triumph when we were able to maintain two of the rarest, most temperamental animals on this earth — our Duck-billed Platypuses — for the long span of ten years, a feat never before accomplished and never likely to be duplicated. By contrast, sometimes there are sad happenings such as the death some years ago of young Herbert, the Zoo's endearing Walrus, who swallowed a tennis ball that some child unwittingly threw into his pool. Fortunately, triumphs far out-number such distressing accidents that can happen to all living things — people and animals alike.

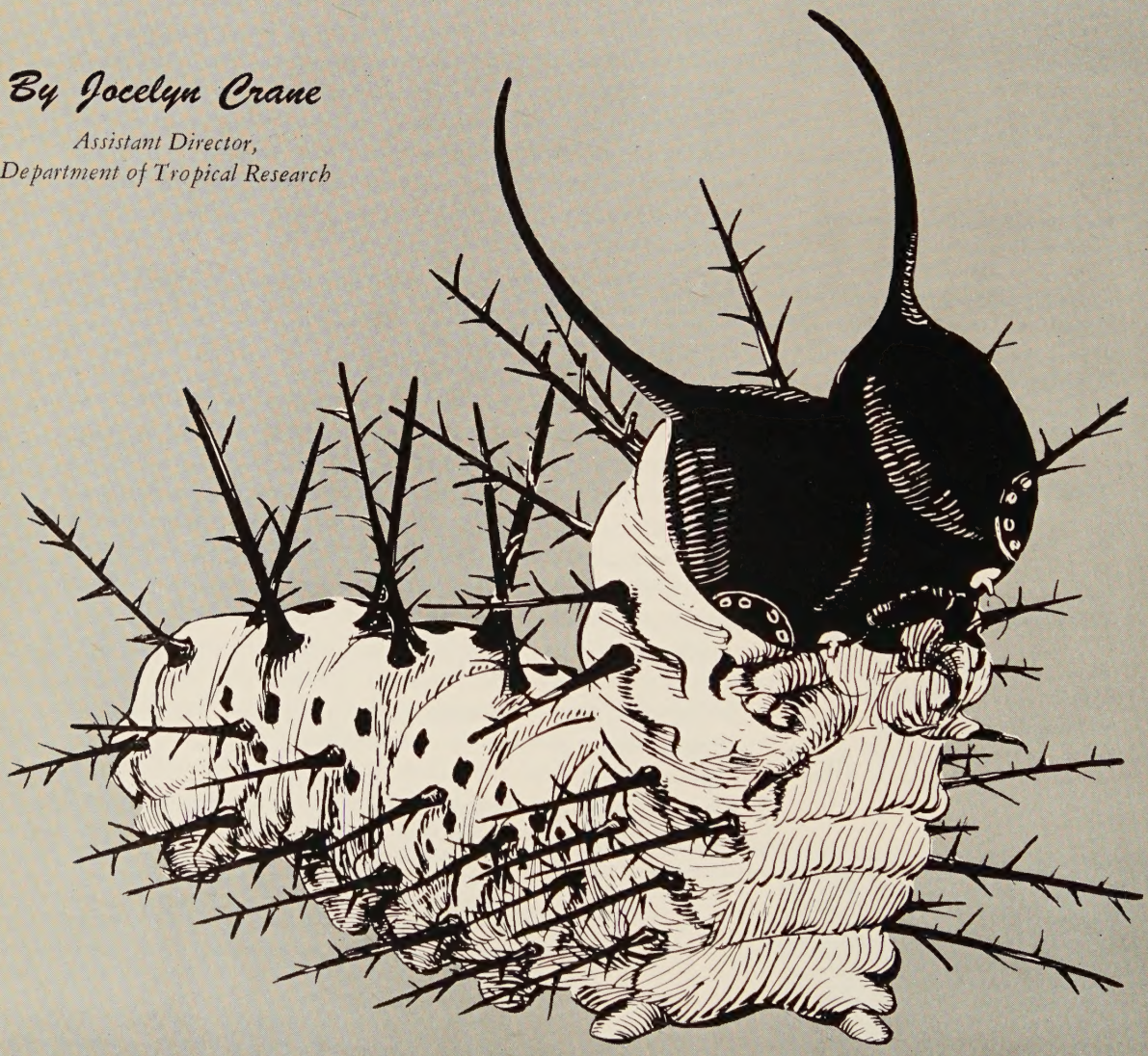
As time runs on, new ideas will develop that will add to the welfare of our animals. For *only the best* is good enough for the wonderful creatures that are in our care.

Fairfield Osborn

Butterfly Discoveries and Surprises

By Jocelyn Crane

Assistant Director,
Department of Tropical Research



Line drawings by
Frances Waite Gibson

SOME SCIENTIFIC PROBLEMS give the lucky people who struggle with them a glow that lasts all through the work. The hows and whys of evolution in a group of brilliant butterflies give us that pleasure here at Simla, the Zoological Society's Department of Tropical Research station in Trinidad. And, while the largest mysteries remain, encouraging pieces of puzzle are frequently solved, like clues in a treasure hunt.

The butterflies all belong to a subfamily, the Heliconiinae, that is most abundant in the jungle glades of the American tropics. Here in Trinidad we have fourteen different species — an excellent number for the comparative work we need to do as a foundation for the research.[1]

Fortunately for color-loving zoologists, most of the helicon butterflies flaunt bright patterns of scarlet, black, orange, blue and yellow in the best tropical tradition. All are more or less distasteful to their natural vertebrate enemies — such as birds, lizards and monkeys — and their "warning colors" are probably remembered by these animals after youthful gustatorial mishaps. Since the bright patterns protect the insects in this practical way, the color development has been encouraged by natural selection.

One of the first discoveries we made, some years ago, was the fact that the scarlet band on one of the species, *Heliconius erato,* is also of use in that butterfly's courtship. First of all we housed inexperienced young butterflies singly in roomy out-of-door cages,[2] and then watched their behavior when they were confronted with strangely painted members of their own species, and with odorless paper models. It was soon clear that a female painted black or blue was usually a wallflower, while an all-red model was even more attractive than a normally banded one. Ultimately, when all proper experimental precautions had been taken, there was no question but that the bright red band characteristic of *erato* was an important asset in winning a mate.

Since then we have learned that various colors are also important in the courtship of several more of our fourteen helicons. On the other hand, we are now finding that in some of the species color plays no discernible part at all in their social lives;

This Heliconius butterfly is feeding from a Lantana in one of the butterfly houses at Simla. Two spots on its wing are dabs of yellow paint, put on to identify this specimen among its fellows.

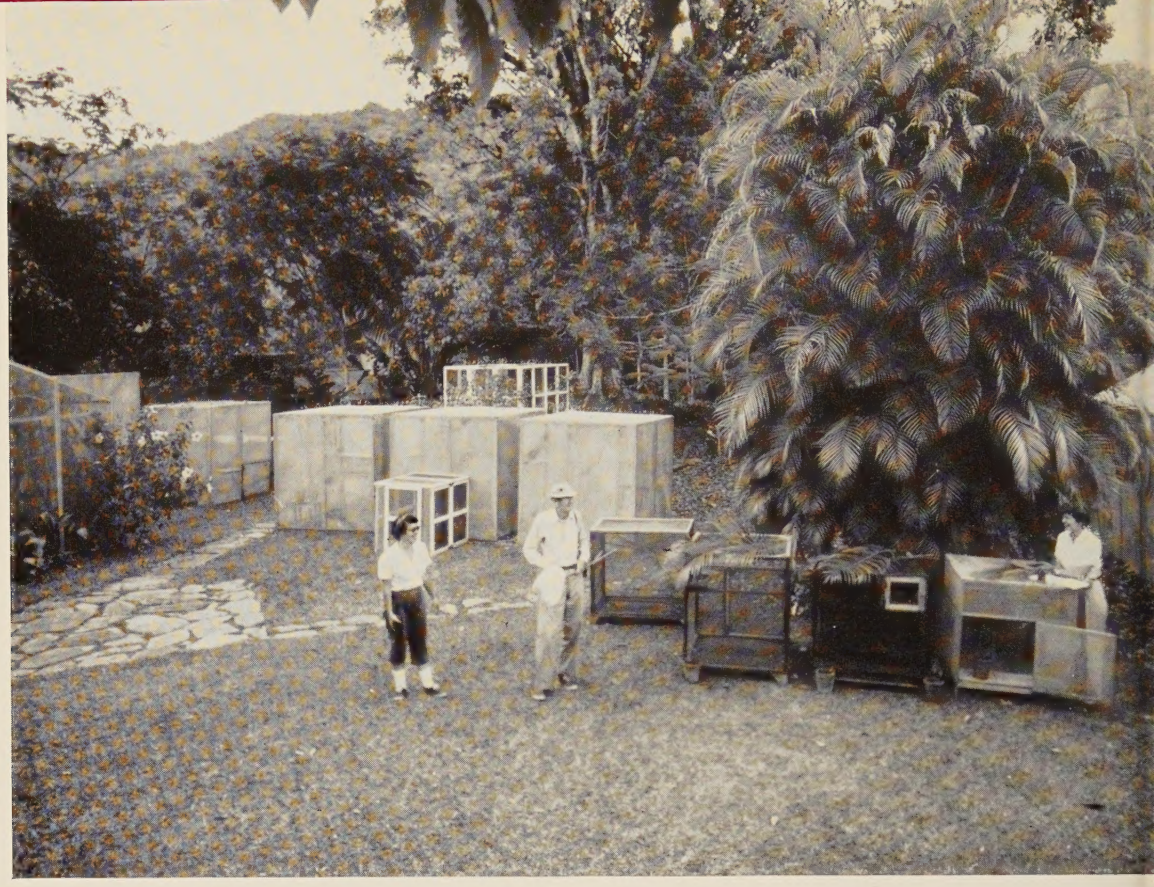
Russ Kinne Photo

in these forms only special flight motions and the fragrant odors from scent glands are used in bringing the sexes together. Their yellow spots and tiger-like stripes seem to be wholly disregarded.

Surprisingly, one or two of these species are closely related to those that use color in their courtship. Butterflies as a whole have an excellent color sense, and it seems unlikely that their capacities differ within this single subfamily. How does it happen, then, that only some of the helicons use color in courtship? How did the attraction to a particular hue in a butterfly pattern first arise? Which came first, back in the early days of helicons in jungles of the past, species that used color in courtship, or those that did not? Such puzzles in basic science help our understanding of many

[1] The Department of Tropical Research wishes to express its appreciation for generous support of the study of helicon butterflies to the National Science Foundation (Grant G-6376), the National Geographic Society and the Alcoa Steamship Company.

[2] See *Animal Kingdom,* 1954, p. 138.



general problems in biology. Knowledge of animal vision, the development of social behavior, the relationships of behavior to physiology — all should benefit.

Another part of the helicon study has more nearly reached its end. Last season we finally reared enough material to disentangle the genetics of the variable, black-and-red helicons of Surinam. These striking polymorphic forms are characteristic of two species, *H. erato* and *H. melpomene*. Some individuals have much more than the usual amount of red. Instead of a single vivid band across the forewings, scarlet radiations make sunbursts at the wingbases, and there are often other additions to the gaudy pattern. It was already apparent to us, as mentioned above, that red has a double adaptive value, being useful both in courtship and in warning off enemies. Since, in Surinam and nearby countries, the red is capable of this extra development, we wondered why the forests were not full of solid red butterflies, all superbly protected and all outstanding social successes.

In 1954, Dr. Beebe, Henry Fleming and I made a field trip to Surinam investigating possibilities for studying these polymorphic species. We managed to collect a tantalizing sample of eggs, and proved they could be transported to Trinidad, reared to adulthood and bred through our facilities at Simla.

We had no time to try again until late in 1958, when Mr. Fleming and Field Assistant Sonny Ramlal once more brought back a group of eggs. The following weeks were sad ones because, after a healthy beginning, the stock was struck by a whole series of mysterious diseases.

While we never quite reached the point of sitting up all night with a sick caterpillar, the broods caused us much anxiety with their numerous ailments. We did all we could, sterilizing dishes and instruments, maintaining an isolation ward and trying to interest our medical friends in possible new viruses. We never found, unfortunately, that either precautions or proselyting had any effect. The pattern was the same for weeks. The female butterflies kept on, day after day, efficiently laying endless clutches of eggs. In due course the eggs hatched. Finally, at varying ages, the caterpillars developed grotesquely bent spines, went off their food, prolonged the time between molts, suffered various other symptoms, all unpleasant, and eventually died. Jane Kinne and

Susan Allan, who were rearing the broods that year, performed minor miracles of devotion and ingenuity – and still the ungrateful beasts curled up and expired. Some mornings, after a specially fatal night, the atmosphere among the human beings in the Caterpillar Room would have been appropriate to the losing team in the World Series.

Finally, last year, the Surinam field trip was repeated. This time we managed to rear 15 adults from the eggs, including, to our rejoicing, several well-defined varieties with extra red. Eight of the 15 were, for various reasons, failures as founders of dynasties. For example, spiders killed Connie and Fernando, and Nellie's eggs were infertile. But four females – Pamela, Eve, Hedi and Bertha –were placed in separate cages, and mated to three of the males – Maharajah, Sam and Dennis-the-Menace. The latter was named by one of his admiring attendants because he not only possessed more red markings than any of the others but flew about with special verve.

These seven butterflies formed the nucleus of all of the season's breeding stock. From them and their descendants, plus several crosses of their progeny with normal Trinidad individuals, we secured three more generations. Between February and July, 35 females laid a total of 2,767 eggs. And from those eggs we reared to maturity a total of 788 adults.

From all this material have come our preliminary answers. Briefly, when a normal butterfly is paired with an individual with extra red markings, about three-quarters of the offspring also

terfly cages of many sizes i styles dot the rear garden he laboratory and all are in stant use by Miss Crane.
Russ Kinne Photo

One butterfly house contains a tropical garden, varied enough to provide food and egg-laying vines for any species studied.
Natica Waterbury Photo

have extra red. In other words, more red in the pattern is always dominant to less red, in ratios that emerge according to basic rules of genetics. When both parents have the dominant extra red, the young theoretically all would have the additional red, and the jungles would soon be full of practically scarlet butterflies. This is not the case, our preliminary conclusions show, because the young of such gaudily colored parents are few and sickly, and one after another they come to unproductive ends.

While caterpillars are famous for turning into butterflies, it has seemed to us lately that nobody yet has given any of them enough credit for its looks, equipment and performance as a caterpillar. We have been watching, tending and worrying over these larvae now for some years, and we never stop being surprised.

Until two seasons ago, we were so engrossed in the adult butterflies that we viewed the caterpillars merely as the inevitable precursors of our winged pets. We housed them in the individual glass dishes they required, fed them passion vine leaves of the proper species and finally gave them wire netting or green leaves upon which to hang themselves as chrysalids.

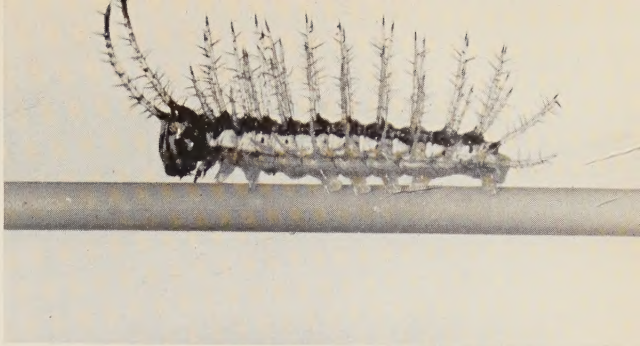
Recently, however, we have been working with the immature stages themselves, fitting a comparative study of their anatomy into the general survey of the group.

We were amused and impressed every time we looked at a caterpillar under the microscope. Every one of our fourteen species had a kind of carnival flamboyance. It showed in the mask-like markings on their faces, and in their bright and varied patterns; some were striped or polka-dotted in black and white and orange, and all bristled with black spines.

Simultaneously, Anne Alexander started work on their behavior patterns. She found that the species differ as radically in their habits as they do in appearance. Our next job with the larvae will be, accordingly, to tie up such anatomical characters as length of spines with aggressiveness or social behavior or defense. For instance, Dr. Alexander noticed, as she states in an issue of *Zoologica* now in press, that two of the species strike at intruders on their leaves with their long head spines. Meanwhile our studies of spines showed that these are the two species with the longest head spines in the group in relation to their size. We now must sort out in detail relationships among degrees of unpalatability, gregariousness and spine length.

It is probably just as well for the progress of our scientific study that the caterpillar tenders

during these recent crowded seasons — Jane Kinne, Connie Carter, Frances Gibson and Susan Allan — have all been devoted to their charges. Because a roomful of caterpillars can be, and usually is, a nuisance, especially when almost every larva must be kept isolated from all others, in its own dish, complete with air conditioning and food. It must in fact be fed and cleaned daily, and sometimes more often.



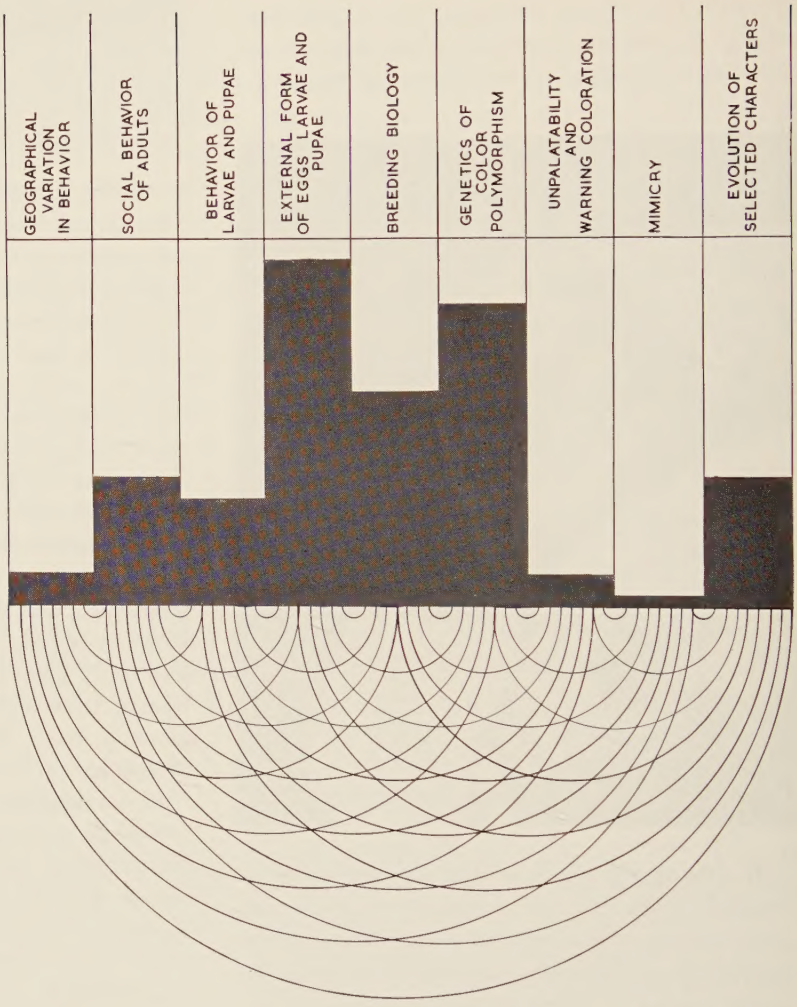
Left — During genetics studies 547 larvae were tended in the caterpillar rearing room at one time. Above — a full-grown caterpillar rests on its dinner — a passion leaf vine. The white object is a wad of damp cotton to provide moisture. Top — This caterpillar of Heliconius aliphera, about ¾ in. long, uses its spines to prod other caterpillars. Below — White areas indicate color (red) variation in H. melpomene.

Russ Kinne Photos. Drawings by Frances Waite Gibson

At our time of greatest expansion, which was in the final weeks of the work on polymorphic broods, we had 547 caterpillars in the laboratory. As many as 32 eggs hatched in a single morning and on more than one evening we gathered more than 40 eggs from the butterfly houses, each snipped carefully with fine scissors from a leaf.

All of this work entailed the collecting, chiefly by field assistant Roodal Ramlal, of about 130 passion vine leaves a day, graduated in size and tenderness, depending on the size and species of larvae to be fed. A young larva given too tough a leaf could gnaw ineffectually and suffer malnutrition; on the other hand, the largest larvae apparently have physiological need for old and fibrous leaves.

If the diagram on page 40 looks more like an intricately connected chain of firecrackers than the statement of a scientific problem, perhaps that is all to the good, since an absorbing piece of research often has a kind of psychological crackle about it that seems a bit like an old-fashioned Fourth of July. The figure shows the nine phases of the helicon problem that concern us the most. Simultaneously, it reminds us of the manifold interconnections within the group, where progress on one front inevitably influences and is influenced by progress, or the lack of it, in each of


A COMPARATIVE STUDY OF FOURTEEN SPECIES OF
HELICONIINE BUTTERFLIES IN TRINIDAD AND SURINAM
GEOGRAPHICAL VARIATION IN BEHAVIOR
SOCIAL BEHAVIOR OF ADULTS
BEHAVIOR OF LARVAE AND PUPAE
EXTERNAL FORM OF EGGS, LARVAE AND PUPAE
BREEDING BIOLOGY
GENETICS OF COLOR POLYMORPHISM
UNPALATABILITY AND WARNING COLORATION
MIMICRY
EVOLUTION OF SELECTED CHARACTERS

The relative advancement of the projected work in nine aspects of the helicon butterfly study is indicated in this diagram. The interlocking semicircles suggest the relationship of each phase of the work to every other phase. Progress, or the lack of it, in one area inevitably affects the advance of the other aspects.

Drawing by Julie C. Emsley

the others. The height of the firecrackers — or smokestacks, if you will — merely gives an arbitrary estimate of the relative amount of progress we have made in each of the fields up to now. By the time this piece goes into print, we hope and believe that most of the smokestacks will be higher. There is, of course, no possibility of putting a tidy scale, climbing to a potential 100%, at the side, to indicate possible progress. Although we naturally hope that all of the relationships will eventually lead to some illuminating starbursts of general knowledge, that happy day will most likely not happen in our time.

In thinking of the edging forward of the various fields, it is pleasant to think, not in terms of fireworks or burgeoning smokestacks, but rather of an ancient Chinese rug. The kind that comes to mind must always have grown by bits, through years of patient work, with now a road emerging in the pattern, then a bridge, here a bat and there a golden dragon. And in this complex study we feel increasingly the need to follow Haeckel's advice to naturalists, more than a hundred years ago, to ground themselves more thoroughly in philosophy, and especially in logic. More specifically, we are answering the call of that fine English entomologist, Dr. Eltringham. In 1916, after working in somewhat frustrated happiness on dried collections of helicon butterflies, he pleaded for someone to study them alive and at home in the tropics. Well, we are doing our best.

"TEEN-AGE" PROBLEMS IN THE WILDERNESS

By MARGARET ALTMANN

Moose & Elk Researcher,
Jackson Hole Biological Research Station

THERE IS A GREAT DEAL OF TALK nowadays about the behavior problems of human teen-agers as a group that neither meets the standards of adults nor fits into child behavior patterns, and so it might be helpful to raise the question of whether this is exclusively a problem of human society or whether we find the roots of teen-age troubles in the world of animals.

My long-range studies on wild, free-ranging game animals have revealed certain things about the role of the juvenile in nature. These observations were made on the western slopes of the Continental Divide, and human interference with the animals was strictly avoided.

A few years ago I reported on the close bond between the mother Moose and her tiny, long-legged calf, in an article in the May-June, 1957, issue of *Animal Kingdom* entitled "Life with Mother." Let us now take a look at the social life of the juveniles, the yearling Moose and Elk in the wilderness area of Wyoming's swamps and mountain slopes.

The yearling Moose has to undergo a tremendously trying change in its life pattern. In early spring, about two weeks before the new calf is born, the previously friendly and attentive mother suddenly becomes hostile to the yearling.

First by her gestures, and then if necessary by actually enforced action — by striking with the front hooves — the cow drives the juvenile away from her. No other animal I know can express hostility or even unfriendliness more clearly than a Moose. The cow lifts her long face, drops her ears downward and backward and close to her head, and chews violently, gnashing her teeth so that saliva foam appears. Her expression as she looks at the yearling from the corner of her eyes is unmistakable and it indicates "Go away . . . or else!" The yearling understands, all right; it immediately yields and flees but after a short interval it tries to return. When its attempts to return to the side of its mother are repeatedly frustrated, the yearling appears to be under heavy

The life of a young Moose is fairly uncomplicated at this early age; he has a close bond with his mother. But life changes radically when he becomes a yearling outcast.

The Moose cow and her teen-ager are still together but the relationship will break abruptly just before a new calf is born.

Photo by the author

stress. For the time being it abandons its usual activities and wanders aimlessly. Obviously, although six months or more have passed since it was weaned, it is still inadequate to manage its daily life alone, independent of its mother. The actual feeding is not a problem, but the selection of a feeding site, the daily routine of choosing a satisfactory place for rest and sleep, the many details of timing and location and, last but not least, the contact with other Moose and the consequent security, present definite difficulties at this point. In all wild game the very young ani-

This is a satellite situation — big bull Moose has a teen-ag Moose as a companion. Old bu may be tolerant, even friend

Photo by the author

By this general posture a Moose cow expresses anger and aggressiveness and her yearling knows exactly what she means.

Photo by Dr. Dixie Smith

mals rank socially with their mothers. This "adult" preferred rank is lost when the juvenile fends for itself. It suddenly ranks low, and every encounter with another animal, even another Moose, becomes a risk and a humiliating experience.

The juvenile Moose finds various solutions for its dilemma. The most frequent way out is a "life in the margin," or partial return to its dam. The yearling stays at a distance but within sight or hearing of its mother, far enough not to be chased but close enough to get cues of impending movements and activities from the dam. This distance is found by each juvenile by trial and error, but once established it seems to work rather well. In the course of the summer, when the cow's new calf is getting stronger, there can be a gradual shortening of the marginal distance for the juvenile, although in no case a complete return.

Another solution found by teen-age Moose is the search for a substitute attachment, usually to an older bull. We call this a satellite attachment, because the teen-ager moves in the dependent position of a follower. The bigger bull Moose determine when and where to go; they show, in fact, a surprising amount of tolerance and even friendliness toward the young satellites, waiting for them when obstacles delay them and tussling with them and shielding them when strange Moose appear.

The third way out of this teen-age crisis is the formation of a juvenile band of several yearlings and two-year-olds roaming on their own. Although this solution brings a break with the familiar habitat and type of security, it offers definite advantages compared to the fourth and last solution – for the juvenile Moose to strike out and live alone.

There is no question but that personality differences in these teen-age individuals, and not solely the environmental situation, help in determining which of these various solutions will be accepted. In some cases I observed that juveniles tried several solutions in succession.

It takes weeks or even months before the teen-age Moose is accustomed to separation from its dam, and more hardship and upheaval are in store for the poor juvenile with the progress of summer into fall. The mating season of Moose starts in September and the early shadows of the social unrest connected with it bring a new and intensified crisis for the young Moose.

In order to understand this situation, we must visualize the highly dramatic social picture of the Moose during the rutting season. Each mating group consists of one bull Moose and one cow. The cow may have her young calf by her side, but any other Moose, male or female, is not tolerated within sight or hearing. The mature bull will threaten any other male, most of all a teen-age upstart, and if he finds any hesitation or resistance he uses his heavy antlers to drive the intruder out. A teen-age bull lives in continuous fear and caution during this period. Even his satellite relationship with a previously friendly and trusted older bull comes to a sudden end. Tentative sparring by the older Moose be-

comes more frequent and by the end of August the fights are severe and brutal. With the ending of the satellite relationship, the juvenile has to flee.

But young males are not the only ones with problems; the female Moose teen-ager also has difficulties. It is jealousy over the bull Moose which causes hostility and actual fighting among the cows, and so the female yearling living "in the margin" near her mother encounters this hostility and must leave the area, carefully avoiding the trails of other adult Moose groups. Twin calves, when they reach the yearling crisis of being driven off by their mother, often stay together and thus ease the burden of strange environment.

The result of these crisscross persecutions is a bewildered and erratic life for the teen-age Moose. The first manifestations of a beginning sex drive in these juveniles are all but lost in the turmoil of being driven away and in constantly yielding to social domination.

Let us see how the Elk (Wapiti) juveniles fare in the social grouping of their elders.

Elk cows are also tender and attentive mothers. They have, however, a different pattern of motherly care from that of the Moose cow. They live in herds and so the herd becomes a second home for the yearling while the cow is producing a new calf. The Elk cow, too, drives the teen-ager from her side and does not tolerate its close approach to her new calf, but the herd offers a "place of belonging" to the juveniles throughout the ensuing months.

The Elk's fall mating season reshuffles the big cow nursery groups into harems of five to fifteen Elk, which are joined by a harem bull, and this is when the young male Elk, the "spikes," have their time of hardship.

After a flareup of sex drive and courtship behavior during the pre-rut, when they squeal and kick and try to bugle although their voices are still juvenile, they are faced with the scorn and fighting spirit of the big bulls.

This is serious and dangerous business. There are two main categories of bulls – the harem owners, the most formidable bosses; and the roaming bachelor Elk, a sneaky sort of pretenders, often hidden in dense undergrowth but always ready to intrude and fight.

Both types of bull Elk keep the spikes on the run. The erratic wanderings of the teen-age bull Elk are not so much determined by the wish to go someplace as by the necessity of avoiding the big bulls. No wonder that the spikes turn up in the least expected or suitable places. In their confusion and bewilderment they do not hesitate to walk on a busy highway or into firing lines of hunters, which all other Elk know enough to avoid; they may even wander into motels or village squares.

I once had an escort of two spike Elk for three miles while riding with my packstring along the headwaters of the Snake River. Since none of us looked or smelled like a bull Elk, and no one bugled, the spikes felt quite safe in marching along behind the packhorses.

As little or no antagonism is shown by Elk cows against other females, the female yearling can remain in the herd group even during the rutting season. These yearlings do not manifest any erratic or foolish behavior.

Observation of the erratic behavior of teen-age groups of Moose and Elk forces us to conclude that it is mainly frustration and non-acceptance by their own group which causes the peculiar behavior pattern of non-conformity.

High mortality and relatively lowered vitality in the teen-age bracket are the results of these hardships. Nevertheless we find that a large number of juveniles achieve a gradual and eventually successfully integration into their species pattern.

Of course, any interpretation of the selective value of the teen-age difficulties has to be made with great caution. Also the tempting analogy with special behavior patterns in human teen-agers will have to wait until considerably more facts on variability and causes of non-conforming behavior in animals are known. It does seem, however, that careful case histories and further observations on wild, unrestrained individuals and animal groups may lead to better understanding of the forces causing "normal" and abnormal behavior.

As for now, presenting the picture in bold strokes, we may clearly recognize that the in-between group of the yearlings among wild game animals has problems of social acceptance, and reacts to these difficulties with erratic, non-conforming behavior.

Hair-trigger Mousetrap with Teeth—

THE LEAST WEASEL

By WILLIAM BRIDGES

Curator of Publications

ONE WAY TO DESCRIBE a Least Weasel is to liken it to a hair-trigger snap mousetrap —a mousetrap with teeth, curiosity and aggressiveness. Nobody handles a Least Weasel or any weasel, even with leather gloves, but you have the impression that if you did, it would simply explode into fragments of nervous energy. (Actually it would probably die of excitement-induced shock.)

Later this spring, if we can get an air conditioner installed in one section of the Small Mammal House, visitors will be able to see the first specimen of the Least Weasel we have ever exhibited. Ours is one of the more northerly of the four forms (*Mustela rixosa rixosa*), ranging over most of Canada, and it likes temperatures somewhat lower than we can normally provide in the Small Mammal House. It came to us from the Alberta Game Farm in Edmonton, Alberta.

For the moment we do not know the sex of the little killer, but suspect that it is a female, since females are smaller than the males and ours is only 5¾ inches long, whereas males are said to be as much as 9 inches long.

Least Weasels have an enormous range, starting down in the Alleghenies, covering the Great Lakes States and virtually all of Canada, right up through Alaska (where the subspecies is appropriately known as *Mustela rixosa eskimo*). Apparently they are not common anywhere; in any event they are wary and hard to trap, so that they are seldom seen in collections. Individuals from

Our Least Weasel rears to look over a log, in a typical weasel gesture, before darting forward like a brown-and-white bullet. This picture is enlarged somewhat more than life size.

Its motion stopped by a high-speed flash, the Least Weasel is stretched full length beside a ruler, showing that it is about 5¾ inches long. This picture is made to the same scale.

the northern part of the range are supposed to turn white in winter (except for a few black hairs in the tip of the very short tail), but ours remained brown above and white beneath. Least Weasels have one color peculiarity; unlike any other weasel, their fur gives off a purplish fluorescence under ultraviolet light.

Victor H. Cahalane, who writes entertainingly about the weasels in his "Mammals of North America," remarks that "The weasel is the most bloodthirsty of all the mammals." Once it starts killing – in a poultry yard, for instance – it seemingly cannot stop, and one is known to have killed forty fowls in one night. On the other hand, not all weasels are habitual chicken-killers, and mice, rats, rabbits, squirrels, young birds, even snakes, frogs, lizards and insects are probably their commonest fare. As mouse and rat killers, alone, a weasel qualifies as a pretty good animal citizen. It is likely that even a Least Weasel could and would kill a rat, an animal much bigger and heavier than itself. Watching our Least Weasel threaten a hand momentarily introduced into its cage for cleaning or placement of food, you are quite willing to believe that it has the courage to tackle almost any foe.

Weasel attack strategy is dictated by its "nose-mindedness" in hunting. When the scent has led it close to its prey, it makes a rush that generally overwhelms the victim in a tangle of limbs and lithe body; a fraction of a second later the weasel has bitten through the back of the neck or a vein and has begun to drink the blood. That, however, is only an appetizer; it apppeases its hunger with the flesh of its prey. Our Least Weasel, incidentally, is thriving on horsemeat and when on one occasion it was offered a mouse (dead), the mouse was sniffed and disdained. Weasels seldom touch carrion except meat they have carried into their own burrows.

The weasel is not a do-it-yourself builder of his home; rats and prairie dogs and other naturally burrowing animals (the weasel's victims, in fact) dig the burrows and the weasel appropriates them. Construction of a nest lined with fur or feathers is about as far as a weasel goes in housekeeping details. Ours has not been provided with a tunnel, but it does have a gnarled log in its cage, and behind this, and partly beneath it, the little animal has made a snug retreat out of shredded tow, which we provided.

ANIMAL NEWS IN PICTURES

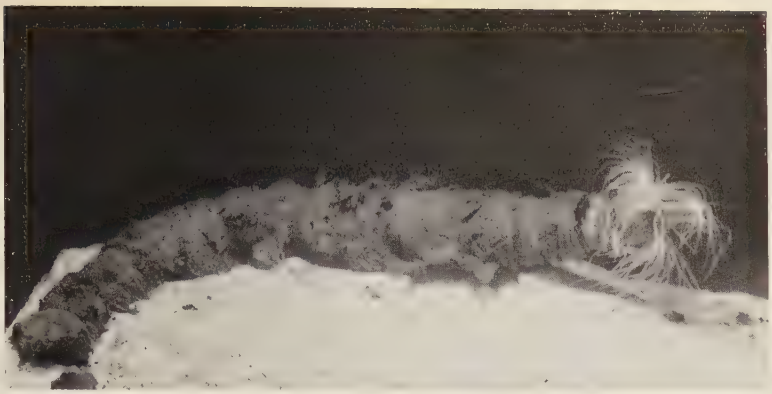
PHOTOGRAPHS
BY
SAM DUNTON

The rate of growth of the big snakes is always a matter of general interest and periodically the Reptile Department has been weighing and measuring its largest specimens. These are two scenes from the day-long wrestling match on March 7 when the Reptile House keepers (with a tail-hold assist from the Mammal Department) measured and weighed its big pythons and largest crocodilians. This **AFRICAN ROCK PYTHON**, father of a brood hatched in 1960, was 12 feet 11 inches long and weighed 88 pounds.

For a good many years there has been no shortage of **DINGOS**, or Australian Wild Dogs in the Zoological Park – fifty have been born to the pair we received from Taronga Zoo in Sydney in 1954. The six shown here are from a litter of eight born January 1; a male and a female are being reared separately for future exhibition and breeding.

The **FAT DORMOUSE** of southern Europe is also known as the Edible Dormouse, for it appears to have been relished by the Romans. We have six, but they are for exhibition, not eating; we are now training them to sleep at night and stay awake in the daytime. They will eventually be shown under red light in a special series of exhibits being created in part of the Small Mammal House.

This is a full-length picture of a **SEA ANEMONE** of the species whose "blossom" appears on the cover of this magazine. The animal lives in the tube, which it secretes itself and which has a texture rather like felt. In nature the tube stands upright in sand or mud; this one is 28 in. long. Several specimens recently came to the Aquarium from the Mediterranean and they are thriving.



The **GAYAL** from the hilly districts of northeastern India is an imposing animal that looks as if it might be a very tough customer at close range — that is, until you get near enough to notice its placid bovine eyes and gentle ways. There are no wild Gayals, and it is said to be "a domesticated Gaur." We have a pair, both born in the Zoological Park, and on March 6 they produced this female calf. It was unsteady at first but Keeper Reilley managed to hold it up for a first nursing and now it is doing very well on its own.

How Birds Leave the Nest

By ALEXANDER F. SKUTCH

San Isidro del General, Costa Rica

Ink and Water color illustrations by Don R. Eckelberry

ANYONE WHO UNDERTAKES to follow the activities of a pair of nesting birds until their offspring become self-supporting sees much of interest and beauty. But perhaps the most exciting event in the history of the family is the departure of the young from the nest. This is, indeed, the climax of the whole fascinating drama. It is the moment of triumph for the parents, who by the exercise of diligence and caution have brought their eggs and chicks through many perils to which neighboring nests may have succumbed. To reach maturity, the young must still escape many dangers, but they are not so likely to be lost all together as while they lay in a helpless cluster in the nest.

The young birds are commonly divided into two groups by the circumstances of their development. In one are those (precocial, or nidifugous) which, like domestic chickens, are covered with down when they hatch, and leave the nest before they receive food; in the other (altricial, or nidicolous) are the birds which escape the eggshell in a less developed state and must, for a week or more and sometimes for months, be fed and protected in the nest by their parents. No sharp dividing line can be drawn between these two groups, which are joined by transitional forms, yet on the whole this is a useful classification.

Let us begin with a species in the first group. In Costa Rica I studied a Marbled Wood-Quail's nest which was situated on the ground in tropical forest and roofed with dead leaves and twigs. The hen alone incubated the four white eggs, taking

each day a single outing which began around sunrise and lasted between one and a half and three hours. Her mate came every morning to call her from the nest, and at the end of her excursion he escorted her back to it, but he always prudently stopped short some yards away, thereby diminishing the probability of revealing its exact position to hostile eyes.

The four eggs hatched in the interval between the hen's return from her recess at half-past eight on one morning and the following dawn. On this day the mother lingered in her nest well past her usual hour for departure, while her mate, who had come for her at sunrise, moved impatiently through the undergrowth and called with growing insistence. At last the hen answered softly and increased his suppressed excitement. Then, with more low murmuring, she rose and pushed halfway through her doorway. The chicks, whose soft, variegated down was already dry, needed no urging to come forth. One pushed out beneath her while she hesitated in the entrance. When at last she stepped forth, four chubby creatures tumbled out around her. As she slowly advanced to join her partner, they followed with short runs punctuated by brief pauses. Her way led across a long, low, decaying log, which opposed a formidable barrier to chicks who had escaped from their shells less than twenty-two hours earlier. Three soon managed to scramble over and their mother led them off, while the father returned to encourage the weakest one until it, too, found a place where it could surmount the obstacle. Then all vanished into the dark undergrowth of the forest.

The majority of chicks which leave the nest early are hatched in nests on or near the ground or close above water, so that they may easily walk or swim away. But in a number of species, including some of the guans of tropical America, and a few ducks, they are hatched well above the ground, either in an open nest or in a cavity in a tree. How do these chicks, without flight feathers on their stubby wings, manage to reach the earth? One might suppose that the parent would carry them down, perhaps in its bill, one at a time. But few birds seem able to transport their young. The downy chicks simply jump from their nest; they are so light and fluffy that their apparently reckless plunge is rarely fatal.

In Iowa, Frederic Leopold watched many broods of Wood Ducks jump, on the day after hatching, from high nest-boxes in response to their mother's call, and he never knew a duckling to be disabled. Sometimes one struck the ground so hard that it bounced up a few inches and was momentarily stunned, but soon it recovered sufficiently to follow its mother. These amazingly hardy ducklings were then led down a steep bluff a hundred and thirty feet high, across a railroad track, and over a stretch of the Missis-

Left — The Groove-billed Ani. Right — The nest of an ani. These are gregarious birds; even in their nesting they are social, and several females may lay in the same nest. In this particular nest, the eight eggs were laid by two females and all parents helped in incubating.

The Yellow-bellied Elaenia is a small tropical Flycatcher and one of those (in the nidicolous group) whose young require more or less prolonged parental care in the nest.

sippi River the better part of a mile in extent, which they covered in about twenty minutes, swimming close behind the duck.

Intermediate between the two groups of birds are some of the goatsuckers, whose young at hatching are well covered with soft down, but unlike the downy chicks of gallinaceous birds cannot follow their parents and pick up their own food. The parents feed them by regurgitation, much in the fashion of hummingbirds. The Pauraque of tropical America lays two eggs on fallen leaves in the shade of a thicket, and if undisturbed the downy young may remain for days in or near the spot where they hatched. But if molested, as when one sets up a blind and tries to watch them from it, a parent settles down some yards away and utters a peculiar, soft call, which brings chicks only a day old hopping toward it, overcoming obstacles seemingly insuperable by such tiny creatures. Pushing valiantly onward, at last they nestle once more beneath the warm feathers of their father or mother.

Some members of the cuckoo family are also intermediate between the two groups. The anis, lanky black birds with long tails and high-arched bills, construct bulky open nests of sticks which are often the work of several pairs. The eggs of the pairs are laid in a single heap and incubated by all the male and female parents in turn, and the young are reared as a single family. Newly hatched anis are blind and naked, but their development is amazingly rapid. If disturbed when they are less than a week old but already bristling with long pinfeathers, they scramble out of their shallow nests and climb away through the close-set boughs of the supporting bush or tree, often hooking their bills over a twig to avoid a fall. At times they drop to the ground. When all is quiet they return, if they can, to their nest, where they are fed and brooded by the parents like any helpless nestling. Similarly, fuzzy young Hoatzins, whose nests of sticks are placed in bushes above the margins of South American rivers and lagoons, dive into the water when danger threatens. They return to the nest when it has passed, climbing by means of feet and bill and claw-like fingers at the bend of each wing, as Dr. William Beebe has so graphically described.

Birds that require more or less prolonged care in the nest (the true nidicolous group) include practically all the songbirds, pigeons, herons, hawks, hummingbirds and nearly all those birds which breed in holes and burrows, such as woodpeckers, trogons, toucans, kingfishers and motmots. If undisturbed, the young of these diurnal birds most frequently leave their nests in the forenoon, when they are most energetic and active. Yet they may do so at any time of day, and once I watched a seventeen-day-old Yellow-bellied Elaenia, a small tropical flycatcher, make its exit on an afternoon of long-continued, drenching rain. It did this by climbing up among the close-set leaves of the supporting branch until it was well above its nest, and there it fell asleep in the rainy dusk. Presumably it left at this unusual hour because its downy nest had become sodden and uncomfortable.

Birds that grow up in open nests have ample opportunity to stretch and exercise their wings before they take their first flight. One may see young hummingbirds standing in their downy nest and beating their well-feathered wings into a haze, clinging with their feet to avoid being carried off. Many nestlings rest on their nest's rim, or even venture a few inches beyond it over the surrounding boughs, then return to their familiar home. Rarely they take longer excursions, only to rejoin their nestmates who have stayed behind. But my impression is that the majority of true nidicolous birds never sever contact with their nest until the final leave-taking, and then do not return to it save in those relatively few species which use the nest as a dormitory — certain woodpeckers, swallows, wrens, and other birds.

Young birds reared in open nests are not only able to exercise their wings before they entrust themselves to them, but their nests are usually closely surrounded by vegetation, so that their first flight need not be long. Those which grow up in holes and burrows frequently lack space to exercise or even fully expand their feathered wings, and moreover their doorway often faces the empty air high above the earth or else a wide expanse of open water, so that a weak, inexpert fluttering from the nest would be disastrous to them, and their first flight must necessarily be strong and long. To witness the emergence of one of these birds is highly dramatic, especially when one reflects that its safety depends on the efficient performance of an activity which it never had an opportunity to practice.

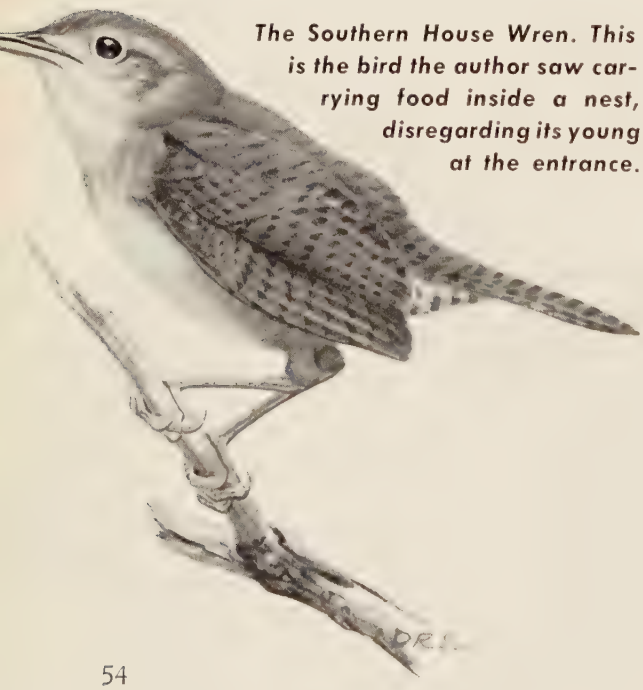
One morning, soon after sunrise, I saw a young Ringed Kingfisher come to the mouth of his long burrow in the bank of a Guatemalan river. For a while he rested there, gazing across the broad stream which sparkled in the sun's earliest rays. At intervals he bobbed his head up and down and uttered a loud rattle. Then suddenly he launched forth, turned downstream, and rose to perch in a willow tree. I estimated that his first flight carried him two hundred feet, with a rise of about forty — not a bad performance for a bird who had passed all his days in the dark earth, unable to exercise his wings.

This kingfisher took the decisive step spontaneously, while his parents were out of sight. This is nearly always the way with altricial birds: if undisturbed, they leave the nest in response to their own growing strength and need of activity; they require no more parental urging to come forth from the nest than at an earlier stage they needed to make them peck their way out of the eggshell. But as the time for their departure draws near, they are in a state of unstable equilibrium and the slightest stimulus may set off their flight, just as the gentlest touch will cause the sudden opening of some explosive seed-pod, like that of the jewel-weed, which without interference would burst open ten minutes later. While I watched two young Violet-headed Hummingbirds in their downy nest above a rushing Costa Rican stream, a small, harmless flycatcher flitted past and caused one of them to fly out. Half an hour later, its nestmate did likewise, quite spontaneously. But it is otherwise when danger seems to threaten the young. Thus when a man approaches a nest, especially if the parents are at hand, the excitement of the latter, their calls of alarm, may stimulate the youngsters to jump out and flutter away several days before they would otherwise have left.

Violet-headed Hummingbirds — male on the left and female on the right. The author saw young leave the nest when a flycatcher passed.

There are numerous accounts of parent birds coaxing or luring their reluctant or timid young from the nest, often by withholding food from them. Since I have from concealment, or from a good distance, watched the departure of many young birds, from kingfishers and trogons to tanagers and finches, yet have never witnessed a successful attempt of unalarmed parents to persuade fledglings to leave, I am skeptical about the interpretation of some of these episodes. Apparently, in some of these cases, the observer's presence excited the parents, which would greatly alter the course of events.

How difficult the interpretation of birds' behavior can be was impressed upon me some years ago while I watched a burrow of a Rufous-tailed Jacamar, a starling-sized bird with a long, sharp bill and plumage that glitters like that of a hummingbird. When the first nestling came to the mouth of the tunnel in a bank, its mother, approaching with a dragonfly, twice hovered in the air in front of it, then flew off without delivering the food. This may have been an attempt to lure the youngster from the burrow; but more probably the parent did not deliver the dragonfly simply because the fledgling was now filling the mouth of the tunnel and left her no place to alight. The next meal that the parents brought was taken to the stay-at-home rather than to the fledgling who meanwhile had come forth, and this seemed to indicate that it was indifferent to them whether their youngsters stayed in the nest or emerged.



The Southern House Wren. This is the bird the author saw carrying food inside a nest, disregarding its young at the entrance.

Similarly, I have seen Southern House Wrens, on coming with food, push past a fledgling who was at the entrance of the nest box, on the point of departure, and take the morsel to another inside, probably because the one halfway through the opening was in a position where it could not conveniently be fed. After the first of three young Black-crowned Tityras left their nest in an old Woodpecker hole, high in a branchless trunk on a steep mountainside, the parents seemed eager to bring the other two into the open. But all their coaxing in front of the hole was of no avail. The three youngsters left on three consecutive mornings, all at very nearly the same hour, and this regularity in the time of their departure was to me convincing evidence that they took the decisive step in response to inner prompting.

Although it is by no means the usual way, some parent birds do tempt their young with food to leave the nest, and in a few species this may be customary procedure. Colonel Meinertzhagen published a vivid account of how parent Ospreys at a Swedish lake displayed food to their nestlings from a distance, until the latter were forced by hunger to fly from the nest and receive it. Mrs. M. K. Rowan reported that it was the regular practice of the Redwinged Starlings who nested on her porch in South Africa to withhold food from their young when the time for their departure was at hand. When one brood, which had clung to the nest longer than usual, failed to respond to this enticement, the father lost patience and proceeded forcibly to evict the fledglings. Despite his mate's effort to shield her offspring from his rough treatment, he lifted two of them bodily out of the nest and dropped them on the floor of the verandah. Then he pecked and pushed them over the edge of the high perch into the sheltering vegetation of the garden. No comparable instance of forcible expulsion from the nest has come to my attention. In my experience, parent birds lead or lure to a safe place fledglings who have already ventured forth, far more often than they try to make them leave the nest.

EYES AT THE EDGE OF TWO ELEMENTS

The Mudskipper seems to spend more time out of water than in it. When on land, it rests on its two pelvic or ventral fins and "rows" itself along with its fleshy-based pectorals.
Lilo Hess Photo

By JAMES W. ATZ
Associate Curator, New York Aquarium

FROGS AND FISHES are strikingly different kinds of creatures, and even people not particularly interested in natural history feel confident that they could tell one from the other without any difficulty. The Aquarium now has on exhibition, however, a fish that is regularly mistaken for a frog. Over and over again, visitors exclaim, "Oh, look at the little frog!" Then, after reading the label, they say, in a tone full of wonder – and often incredulity as well – "It's not a frog. It's a fish. The sign says so." Despite our carefully worded labels, we suspect that some visitors are not quite convinced.

What makes this reaction particularly remarkable is that the fish really isn't very frog-like at all. It has an elongate, fish-shaped body with a fully developed tail, and all its appendages are fins, not legs with feet and toes. Only one small part of it resembles a frog, but here the similarity is so striking that it overshadows all other features of the animal's anatomy.

The fish is the mudskipper, and its eyes are what fool people into taking it for a frog. Instead of being more or less disc-like or flattened hemispheres located on either side of the head, its eyes are perched up on top in a pair of rounded pro-

The eyes of the Mudskipper give its head a superficially frog-like look. They are adapted for vision in air rather than water, as are the eyes of the frog, but unlike the frog eye, they can be rotated in the horizontal plane.

tuberances. They are so like the well known bulging eyes of frogs and they are so prominently displayed that the observer gets the immediate impression he is looking at a frog and doesn't bother to look any further, especially when the fish is resting out of water, as it habitually does. Mudskippers inhabit marine or brackish tidal mudflats and mangrove swamps where they seem to spend most of their time hopping about, either in pursuit of small insects, crabs and the like or in keeping other mudskippers at a distance. The fish is said to be agile enough to catch insects on the wing, but whether or not this is so, there is not the slightest doubt about its ability to capture small prey moving along the ground — like a frog, except that it lacks a frog's prehensile tongue.

Like a frog, the mudskipper must be able to see small objects accurately in order to feed the way it does. Quite naturally the question arises whether there is any connection between the similarities in structure and function of the protruding eyes of the two kinds of animals. The fish's eyes show one advantage over the frog's in that they can be rotated, a nice compensation for the lack of a neck and the ability to turn the head. (This faculty is responsible for the mudskipper's

Like most frogs, the Green Frog remains at the water surface for long periods. With its elevated eyes, it observes what takes place above water while remaining hidden below.

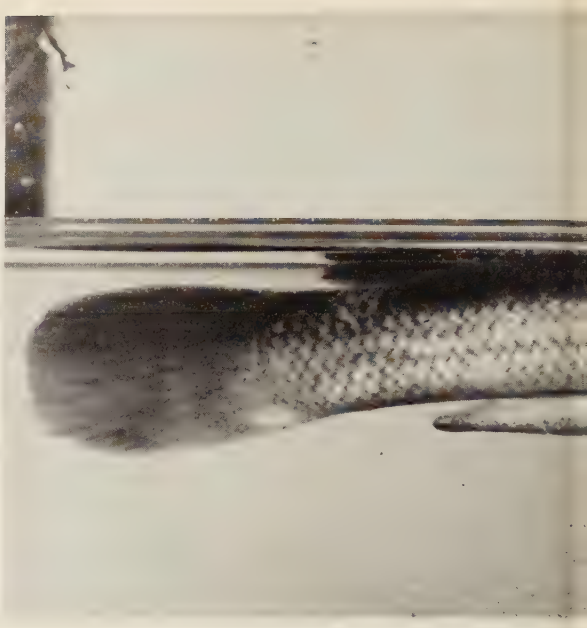
The Hippopotamus spends its days submerged in African rivers or lakes, protected from the tropical sun, but at night it leaves the water to forage. These scenes are from the Congo.
Institut des Parcs Nationaux du Congo Belge: H. de Saeger Photo

scientific name, *Periophthalmus,* from the Greek words, *peri* meaning around and *ophthalmus* meaning eye). Like the frog's eye, the eye of the mudskipper is shaped and its parts arranged so that it functions better in air than in water.

Other animals also have similarly protruding eyes, most notably the hippopotamus, a few salamanders and turtles, and the crocodilians, that is, the crocodiles, alligators and caimans. Although related to one another in only the most distant fashion, they are all amphibious like the frog and the mudskipper, and while they may not be equally at home on land or in the water, they can get around reasonably well in or on both. Moreover, in nature, all of them, except salamanders and the mudskipper, spend a good deal of time at the surface with their eyes out of water and most of the rest of their bodies submerged. Since the eyes of all of them, except perhaps some of the salamanders, are primarily constructed for vision in air, their location at the top of the head enables them to remain in the element in which they function most efficiently, to make the animal

aware of food or enemies while it enjoys the comfort and protection of the water.

Zoologists have a special term for a situation like this in which unrelated animals show similar structures that are associated with a similar mode of life. They call it *convergence*. This is an important concept because it enables zoologists whose job is the classification of animals to avoid errors such as the one made by our visitors. Although professional zoologists have never classified the mudskipper with the frogs, they did at one time, for example, consider whales to be fishes, mostly because they have fins instead of limbs — another good example of *convergence*.



The eyes of Hilary's Sideneck Turtle are elevated more than in many turtles, including the marine species. Such eyes have apparently not evolved in the sea because of the waves.

Swimming at the surface of the water with its eyes just half submerged, this South American Four-eyed Fish is able to see above and below water simultaneously.

The simplest explanation for convergence is natural selection, which Darwin was the first to point out. Animals that inhabit similar environments become modified in similar ways because environments select similar advantageous modifications.

Sharing the tank with the Aquarium's mudskippers, is another, unrelated, species of fish that has the same sort of protruding, frog-like eyes. Although, strictly speaking, it is not amphibious because it does not leave the water to travel on land, it nevertheless spends almost all of its time at the surface with half of its eyes out of water. Half of the eye is adjusted for vision in air, the remainder for vision in water. The pupil is divided into an upper and a lower part, and the fish habitually swims so that the water surface lies exactly at the level of the horizontal separation between the two pupillary openings. From this, the fish gets its popular, descriptive but not quite accurate name, four-eyed fish. By means of this ingenious arrangement, the four-eyed fish can see sharply in both air and water *at the same time*. In the hippopotamus, frog and crocodile, the eye is arranged so that it can remain in one element while the body occupies another. In the four-eyed fish, the eye itself occupies both elements at once.

Crocodilians characteristically float just beneath the surface with only eyes and nostrils showing, as in this young Spectacled Caiman.

News from the Conservation Foundation

Allagash Region Project

The Allagash River, long known as providing an outstanding wilderness canoe trip through the spruce-fir and maple-beech-birch forests of northern Maine, is the heart of the Allagash region, the subject of a new study now under way by The Conservation Foundation on behalf of the Natural Resources Council, Incorporated, of Maine.

Made possible by the generous gift of Mr. David Rockefeller, supplemented by donations from members of the Maine Natural Resources Council and others interested in the Allagash problem, this project will investigate issues involved in the future development, organization and management of the Allagash region. In recent months, proposals involving development of a highway, a hydroelectric dam and additional recreational facilities by government agencies have been publicized. The purpose of the study is to place these various land use proposals in perspective, particularly as they may alter the wilderness character of the Allagash region.

The alternative proposals regarding land use in the Allagash region arise as a natural consequence of increasing pressures for recreation, power, pulp and wood products not only in Maine but throughout the nation. Land in the region is undergoing more rapid development and change than has been experienced in several decades.

Student Program to Continue

Five years ago our organization helped to initiate the Student Conservation Program, an idea suggested to us by its original director, Elizabeth Cushman Titus. It provided opportunities for qualified high school and college students to work as assistants to Park personnel in National Parks, and for four years it was developed with notable success. Recently the National Parks Association indicated that the program would have to be suspended during the summer of 1961. However, it has now been announced by the National Parks Service that because of its enthusiasm for the program, Park personnel facilities will be made available and it will be officially sponsored by the National Parks Service for continuance in the current year. It will assume the new title of "National Park Service Student Conservation Program." Work will be concentrated in the Olympic and Grand Teton National Parks and a few students will also be enrolled at Zion National Park and at Cedar Breaks National Monument. It is gratifying to report that this valuable activity will continue this summer.

Further information may be obtained from the Student Program, Room 922, 50 Rockefeller Plaza, New York 20, N. Y.

Briefly Noted

Fairfield Osborn appeared as guest on "The House We Live In" television series, broadcast by WCAU-TV, Philadelphia, on February 17. Dr. Osborn discussed the problem of natural resources and the population explosion with Professor Ian McHarg of the University of Pennsylvania . . . Stephen Blodgett and Roger Hale represented the Foundation at the 26th North American Wildlife and Natural Resources Conference in Washington, D. C., March 6-8. . . . A Water Research Symposium, sponsored by the National Reclamation Association and the National Association of Soil Conservation Districts, was attended by Wallace Bowman on March 28-30, in Washington, D. C. . . . The first 1961 meeting of the Conservation and Management of Natural Resources Committee of the National Association of Manufacturers, New York City, was held on February 24. Belmont Pitkin attended the meeting and served on its Water Resources Sub-Committee. . . . During February Foundation members served as a pre-screening committee for the 1961 American Film Festival, reviewing films in the category of Wildlife and Natural Resources . . . Martha Munzer, speaking before an open meeting of the Riverdale Garden Club on March 16, pointed out the values of preserving remaining natural areas in the local community.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Night-into-Day Reversal of Animals Succeeding

Nocturnal animals are among the most interesting and at the same time the least successful zoological exhibits. For the most part they are mere balls of fur, breathing gently in profound sleep, during the hours when visitors are in the Zoo. Only the night watchman sees them leaping, running, prowling and feeding — carrying on the active phase of their lives.

Attempts to reverse the activity cycle have been made in many zoological parks for many years and have met with considerable success. We are now resuming our own work along these lines on a rather large scale; the entire northwest tier of compartments in the Small Mammal House is being converted into a reversal exhibit. The first animals tested, a pair of Moholi Galagos, reversed their normal activity cycles in three and six days, respectively. They are now awake and lively during the hours when the Park is open and they sleep through the night.

This was accomplished by flooding the test compartment with bright white light during the night, and illuminating it with red light during the day. The animals have readily adjusted to sleeping in their log shelter at night, under the bright light, and all day long they are almost continually active, exploring their compartment and making graceful, sure-footed leaps from the floor to perches several feet overhead. One in particular likes to leap to the wire grating of a ventilator in the ceiling, hanging upside down and twisting its neck in seemingly impossible positions to watch visitors — going through extraordinary bodily contortions as it leaps down and turns to land on its feet.

The eyes of nocturnal animals are barely, if at all, sensitive to red light, so that while the animals are quite visible to the human eye, they are in subjective darkness during the red-lighted "night" period. A good deal of experimentation has been done to determine the optimum levels of the white and red lights and the red level is now perfectly satisfactory for easy viewing by the normal human eye — and it is apparently quite satisfactory to the animals, too.

Creation of the red wing in the Small Mammal House, including redesigning of several of the compartments, will occupy a good part of the spring and the building is temporarily closed. It will be reopened on Members' Day, June 7, if not before.

Aquarium Asked for Diagnosis of Rainbow Trout Disease

Fish culturists in the western United States discovered a year ago that many of the Rainbow Trout in their hatcheries were suffering from a liver disease that seemed to be an epidemic form of cancer. Because of his extensive experience with fish tumors of all kinds and because he had made studies of this disease as far back as 1954, Dr. Ross F. Nigrelli, the Aquarium's pathologist, was called in to help diagnose it and to recommend corrective measures. He has attended a number of meetings called urgently to deal with the situation, the last of which was an inspection tour in March of state, federal and private hatcheries in the Snake River region of Idaho. It is here that millions of Rainbow Trout are grown each year for stocking sport fishing streams and for marketing in food stores and restaurants.

Part 1 of *Zoologica,* the Zoological Society's technical journal, contains an article that describes in detail the diseased livers of Rainbow Trout. In preparing this analysis, Dr. Nigrelli and Dr. Sophie Jakowska, a Research Associate at the Aquarium, examined the livers of more than 300 fish. As a result of this comprehensive survey, they were able to show that most of the so-called hepatomas were not cancerous growths at all. They also gave good evidence that the disease very likely has its origins in an unfortunate combination of hereditary predisposition and improper diet. — James W. Atz

Left — Director Koga of the Ueno Zoo in Tokyo presided at a ceremony on Feb. 11 as a Manchurian Crane and two White-necked Cranes were sent to the Bronx Zoo in a "Sister City" exchange between Tokyo and New York. Below — The cranes were received at the Bronx Zoo in a ceremony on Feb. 24. Officials of the Zoological Park, City and Federal Government attended it.

Roger Tory Peterson: Text of Citation

For the record — since these things are often buried in institutional records — we print here the text of the citation read by Dr. Fairfield Osborn, President of the Zoological Society, at the Society's mid-winter Members' Meeting on January 9 in presenting the Society's Gold Medal to Roger Tory Peterson.

The words inscribed on this medal are "Inspired interpreter of birds for the benefit of man." Your career cannot be epitomized so briefly. You have worked arduously and brilliantly since your early youth for the benefit of birds as well as for the benefit of man. You have sensed that although birds could get along without man, the lives of innumerable people in every land are uplifted by the presence of the aerial creatures that you know and love so well.

It is said of you that your passion for birdlife, which you have had since your boyhood, "stemmed from the fact that these winged creatures are symbols of freedom." You have traveled tirelessly to the far reaches of many continents seeking greater knowledge and understanding. Your persistent search for detail of form, color and action and your extraordinary gift of artistry have proved invaluable assets in gaining so full a measure of success in the career to which you have given your thought and your energies.

You are not only one of the preeminent ornithologists of any age, but you are as well a true naturalist and a disciple that sings of the beauty and mysteries of all living things.

Besides Mr. Peterson, the Society's Gold Medal has been presented in past years to William Beebe, Raymond L. Ditmars, Senator Fred Walcott, Jacques-Yves Cousteau, Robert Yerkes, Konrad Lorenz and Rachel Carson.

IN BRIEF

Ookie Improves. Newspaper stories during the winter about the indisposition of Ookie, the young female Walrus at the Aquarium, stirred up great interest and many inquiries have been made by telephone and mail. It can now be reported that the abscesses that developed on her left cheek are disappearing, that her appetite is normal, and her weight now 560 pounds.

Snake Mite Control. After more than two years of experimentation, the Midwest Research Institute has developed for us two chemical substances

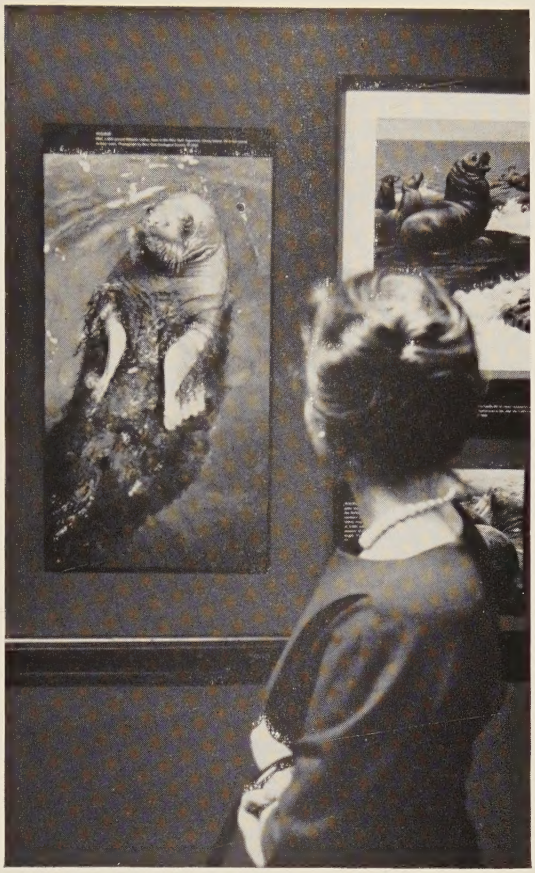
which it believes to be highly effective in the control of snake mites – the scourge of reptile collections in most zoological parks. The new compounds, which we are testing under Reptile House conditions, are said to be better than the "Dri-Die" we are now using for mite control. A report on the new chemicals will be made later.

Talks by Dr. Ray. Dr. Carleton Ray of the Aquarium staff addressed the North American Wildlife and Natural Resources Conference in Washington on March 7 on "Marine Reserves for Ecological Research," and a few days earlier he spoke before the Systematics Discussion Group of the American Museum of Natural History on "Bergmann's and Allen's Rules in Poikilotherms."

Dutch Elm Cotrol. The Dutch Elm disease of elm trees continues its seemingly inexorable march through the Zoological Park. During the past month thirty elms from 8 to 30 inches in diameter had to be taken down and burned, including several on Baird Court.

Five Swan Eggs. Last year our pair of Black-necked Swans began egg-laying out of doors on February 28 and were caught in the heavy snowstorm in early March. This year they started earlier and the first egg was laid on February 26. Five have been laid and we have taken all of them and are incubating them in the basement of the Bird House – a much safer place than the exposed Marsh Garden.

Home Away from Home. During the late stage of construction of a new filter system at the Aquarium, the Oceanic Tank has to be temporarily drained and a Zoological Park pool will therefore be host to two of the Aquarium's California Sealions.



Olaf, the Aquarium's big Atlantic Walrus, was admired in a photograph at a National Geographic Society exhibition in Washington, D.C.

National Geographic Society Photo

IN BRIEF

GATHERING OF SHORE BIRDS. By Henry Marion Hall. Edited by Roland C. Clement. Illustrated with 95 line drawings by John Henry Dick. 242 pp. The Devin-Adair Company, New York, 1960. $10.00.

Like many other natural history publications produced today, this book is a combination of good reading, informative reference and fine art work and layout. The major portion is given over to descriptions of the 57 species of shore birds which have been known to breed on the American continent north of the Panama Canal. Brief accounts under the headings of South American Shore Birds, American Shore Birds in Europe, European Shore Birds in America, Siberian Shore Birds in America, plus a most useful bibliography, round out the text most satisfactorily. It is a useful addition to the bird-watcher's bookshelf, although a trifle high in price. – D. Reville

THE GROWTH OF SCIENTIFIC PHYSIOLOGY, PHYSIOLOGICAL METHOD AND THE MECHANIST-VITALIST CONTROVERSY, ILLUSTRATED BY THE PROBLEMS OF RESPIRATION AND ANIMAL HEAT. By G. J. Goodfield. 174 pp. Hutchinson of London (British Book Centre, N. Y.) 1960. 18 shillings ($4.00).

Any study of the history of science adds a new dimension to one's understanding and appreciation not only of the particular part of science under consideration but of the scientific method itself. This scholarly book well illustrates the tortuous development of important ideas we now take for granted.

THE MECHANISM OF EVOLUTION. By W. H. Dowdeswell. x + 115 pp., 25 text-figs. Harper Torchbook. Harper & Bros., N. Y. 1960. 95¢.

A concise, well balanced and up-to-date account of what the great majority of today's biologists believe is the way that evolution takes place. Written for people with a high school knowledge of biology.

CULTURE METHODS FOR INVERTEBRATE ANIMALS. Edited by James G. Needham *et al.* xxxii + 590 pp., 84 text-figs. Dover Publications, Inc., N. Y. 1959. $2.75.

Not long after this invaluable compendium was first published in 1937, it became one of the most sought-after out-of-print volumes in biology. Now that it has been reprinted, both professional and non-professional zoologists, teachers, scholarship-conscious students, and fanciers with pets that have strange appetites should all rejoice.

KINGDOM OF THE OCTOPUS. By Frank W. Lane. xx + 300 pp., 16 color and 82 black-and-white illus., 13 drawings. Sheridan House, Inc., N. Y. 1960. $7.50.

No animals have been regarded with greater revulsion, combined with hypnotic fascination, than have the octopus, the squid and their relatives. Greatest of all living animals without backbones, they have the most highly organized nervous system of any invertebrate. They are fantastic, mysterious and, in a few cases, truly terrible, but the author has eschewed sensationalism and has let the facts speak for themselves. This outstanding book covers all aspects of its subject, presents a wonderful collection of illustrations and is provided with a most useful bibliography, glossary and index. – J. W. Atz.

GUIDE TO MARINE FISHES. By Alfred Perlmutter. 431 pp., many figures. New York University Press, N. Y. 1961. $6.50.

Salt water fishermen and amateur naturalists interested in marine fishes frequently have difficulty identifying their quarry, even with the help of the best guides available. Dr. Perlmutter has now devised a key so simple and clear that people without any training in biology whatsoever can quickly determine what species they have in hand. Included are all the Atlantic coastal fishes occurring from Cape Hatteras to Cape Cod, except for some rare migrants. Information on size, natural history and relation to man is also provided. – J. W. Atz.

PASTEUR AND MODERN SCIENCE. By Rene Dubois. 160 pp., paperback. Doubleday & Co., New York, 1960. 95¢

A well-written, even engrossing, account of Pasteur's life and his place in modern science. The author is on the staff of the Rockefeller Institute.

SCIENCE PROJECTS HANDBOOK. Edited by Shirley Moore. 254 pp., paperback. Science Service, Washington, and Ballantine Books, New York, 1960. 50¢

A useful guide and handbook for young people who want to work up their own science projects and participate in science fairs.

New Members of the New York Zoological Society

Between January 1 and February 28, 1961

Benefactor
Bernard Gimbel

Founder in Perpetuity
Royal Little

Founder
Joseph A. Thomas

Associate Founder
Robert G. Stone

Fellow
Dr. Jacques Wallach

Life
Peter Wunsch

Contributing
James W. Angell
Dr. John M. Baldwin, Jr.
Miss Frances Browne
John Frederick Bubel, Jr.
Edward R. Bucklin
John G. Cameron
Mrs. Willard Church
Dr. Harvey H. Corman
Mrs. Agnes Dowling
Mrs. William G. French
Edward Gelsthorpe
Mrs. Walter Gerstenberger
Mrs. W. F. Gibbs
Dr. Alice Hampshire-Silver
Mrs. Henry Jude
Mrs. R. A. Katzell
Mrs. Martha G. Kendall
Dr. Walter R. Kessler
Miss Katherine Lewis
Michael Loeb
Mrs. Michael Loeb
Lawrence D. Maran
Dr. Peter J. Marchisello
John I. B. McCulloch
Louis E. McFadden
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Mrs. Anne E. Rogers
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Dr. Jack Sheps
Mrs. Dario Soria
Mrs. Louis Starr
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Jerome A. Straka
Peter S. Van Alst
Robert Vanderbilt
Paul Yakovenko
Philip Zahn

Annual
Heman P. Adams
Miss Betty Barford
Miss Susan Berns
Myron Blumenfeld
Mrs. Patricia Rice Brauner
John B. Brennan, Jr.
Walter M. Carlebach
Gerard Casperson
Richard Detwiler
William A. Dreher
Garson R. Fields, Jr.
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Miss Ingovar Gay
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Mrs. Gertrude Kempf
Leslie Larson
Robert S. Lemmon
Vincent M. Lucchesi
Miss Louisa Maisel
Miss Ruth Martin
Mrs. Robert McLean
Clement E. Merowit
L. Porter Moore
Mrs. Richard Nasman
Miss Dennis Nye
Miss Sue Osterman
Mrs. L. Ressler
Seymour Scharf
Mrs. J. L. Schram
Dr. Karl Schweig
Edgar Z. Steever, 4th
Mrs. Gerard Swope, Jr.
Mrs. John Tehan
Mrs. George Vella
Miss Susan B. Whitney
Miss Alicia V. Wilder
Blix Winston

THE EVOLUTION OF MEMBERS' TOURS

Time was when Members' Tours of the Zoo and Aquarium were impromptu, spur-of-the-moment affairs. A Member would just drop in, with family and friends, the Director would appoint a guide, and off the group would go, up hill and down dale, in and out of buildings and behind the scenes.

Delightfully informal and informative as such tours were, one of the disadvantages was that many Members wanting tours had to be disappointed because sometimes Curators were just not available. They were in Ecuador, collecting birds. Or in Africa, taking movies. Or on a fauna survey study in the cypress swamps. Or that was the day when the elephant was due to be moved.

But now we've corralled these elusive Curators and prepared them to expect a group of Members, with their families and a special friend or two, on four Saturday mornings in April, May and June (see schedule below). And we've also provided them with an effective short-range broadcasting apparatus, so that it's easy to hear what they have to say.

We hope you'll plan to attend, bringing with you a friend who may decide to share your interest in the Zoological Society by becoming a Member.

THE SCHEDULE

April 22—Tour of the Bronx Zoo's Reptile House with Curator Herndon Dowling. Is a boa's skin cold and slimy? NO! You'll discover the truth when you have the chance to touch Headkeeper Spencook's favorite snake.

May 6—Associate Director of the Zoo William Conway will don his other hat as Curator of Birds for this occasion and show Members the Zoo's extensive exotic wildfowl. Bring field glasses if possible, but they're not essential.

May 20—You've read in the papers how Mammal Curator Joseph Davis has changed the activity cycle of nocturnal mammals so that they're now active in the daytime and sleep at night. He plans a preview of new exhibits for Members.

May 27—Photographer Sam Dunton is a man of infinite patience and his know-how in photographing animals is unequalled. On this camera safari in the Zoo he intends to help everyone with a camera—from a Leica to a Brownie—get that perfect shot.

June 17—Curators James Atz and Carleton Ray will be delighted to show Members all the new Aquarium exhibits—and, of course, Ookie and Olaf will be there.

Members' Tours start at 10:30 from Members' Room in the Zoo or the main entrance of the Aquarium. Members may bring others in their immediate family, but not more than one guest. There's no need to give advance notice of your coming—just come and enjoy yourself.

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